Grant Update

Grant #731009

Ultra-Efficient Generators & Diesel Electric Propulsion

Genesis Machining & Fabrication

6/12/16

1. Work Done Since 4/1/15

Since 4/1/15 significant work has been done to bring the prototype BMS system to a functional level. This has included the following elements:

a. Board Modifications

   BMS boards were outfitted with an adapter board to allow more seamless serial cable connection.

b. Head-End programming

   The BMS head was programmed to accommodate n number of cells.

c. Firmware development

   BMS firmware was further developed and tested.

In addition to hardware and firmware development, additional theoretical work has also been done.

a. Energy storage

   It has been recognized that using energy storage along with VSG concept can yield better efficiency and economics in some circumstances. An important step prior to commercialization is to perform a cost-benefit analysis for each operational mode.

2. Tasks to Finish Grant

At this point we have a good understanding of theory and implementation of VSG using a diesel engine as the prime-mover. We have also developed to working prototype levels a general purpose inverter / converter architecture, a battery management system, and an induction machine platform needed to implement the technology. However, the business case for these systems rests on economics and work remains to compare the cost and benefits of different configurations of the VSG system. Specifically, the case of including energy storage in the VSG equation has not been analyzed. Therefore, we see two tasks remaining to wrap-up the grant:

1. Side-by-side simulation comparison of VSG and VSG with storage using data generated from hardware previously during this grant study.
2. Analysis of economics of each configuration.
3. Final grant report.